

PATENT

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ENTITLED

**FOOTWEAR WITH IMPROVED SOLE, IMPROVED SOLE
AND METHOD FOR MANUFACTURING**

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FOOTWEAR WITH IMPROVED SOLE, IMPROVED SOLE AND METHOD FOR
MANUFACTURING

Field of the Invention

The present invention relates to footwear with an improved sole. In addition, the present invention relates to an improved sole and a method for making the improved sole.

Background of the Invention

Footwear typically incorporates elements designed to achieve a balance between comfort, appearance, durability, and traction properties. Slip resistance and traction are particularly important in the design of footwear. Therefore, sole components are essential to the balance of elements for a shoe.

Shoes are typically made from an upper with a sole system attached to the upper. The sole system includes an insole, a midsole, and an outsole.

Midsoles, which provide a cushioning layer between the outsole and upper, are preferably formed from materials that absorb shock while providing stability. Such materials may often include ethylene vinyl acetate (EVA), polyurethane, thermoplastic polyurethane (TPU), or combinations thereof. While such materials exhibit good resilience and shock absorption properties, their shortcomings include poor resistance to wear.

Thus, footwear typically also incorporates an outsole formed from more wear resistant, resilient materials. Such materials typically include rubber, thermoplastic rubber (TPR), polyvinyl chloride (PVC), or other similar materials. These materials are typically laminated, or bonded to the midsole by an adhesive. However, over time, adhesive materials begin to fail. In addition, such materials may make the manufacturing process and resulting product more costly.

In response to the difficulties and problems encountered in the prior art, an improved sole for an article of footwear is disclosed, which is neither taught nor suggested by the prior art.

Summary of the Invention

Objects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description set forth herein.

It is an object of the present invention to provide a shoe with an improved sole having slip resistance and improved traction.

It is another object of the present invention to provide an improved method of securement between midsole and outsole elements.

Yet another object of the present invention is to provide an improved sole for footwear having at least one element therein that has slip resistance, wherein the sole has enhanced integrity.

Still further, another object of the present invention is to provide an improved method for producing a sole for footwear having at least one element forming a part thereof with enhanced sole integrity and slip resistance.

Generally speaking, the present invention relates to an article of footwear having an upper and a sole with the sole including an outsole which includes at least one pod formed from a different material than the outsole. The outsole has a periphery following the general contour of a human foot, and has a forefoot portion and a heel portion connected by an arch portion. Each pod has a ground-engaging end and an upper end with the upper end having a flange extending outwardly therefrom. Each pod is secured in situ within the outsole. The outsole material encapsulates the flange and extends around the pod to form a ground-engaging surface therearound that is generally coterminous with the ground-engaging end of the pod.

In certain embodiments of the present invention, pods may be positioned in the forefoot portion of the outsole, the heel portion of the outsole or both portions of the outsole, with one or more pods in either portion. The pods are formed from a material suitable to afford a slip-resistant surface. The outsole is formed from different material, and one that exhibits good resilience and shock absorption properties. In addition, a flange extends around at least a portion of the perimeter of each pod and may further define one or more openings that the outsole material can fill and encapsulate.

Generally speaking, the present invention is directed to a method for manufacturing a sole for footwear. The method also involves providing mating mold sections defining a plurality of cavities from which the sole may be molded. Each pair of mold cavities defines at least one pod receiving section in one of the pair of cavities. At least one preformed pod is positioned into the pod receiving

section of the mold cavity. The preformed pod has a ground-engaging end and an upper end with a flange extending at least partially therearound and outwardly therefrom, preferably from the upper end. The pod is positioned so that the ground-engaging end is surrounded by the pod receiving section of the mold cavity with the flange extending outwardly and above the cavity. The mold sections are joined to form a complete mold cavity, and outsole material is provided and fills the cavities, encapsulating the upper end of the pod as well as the outwardly extending flange. After curing, the mold sections are separated and the pod encapsulated outsole is removed.

10 In another exemplary embodiment, a method for manufacturing a sole for footwear is provided, at least one pod receiving section is provided in the mold cavities for a forefoot and a heel portions. Otherwise, the method is performed as set forth above.

Brief Description of the Drawings

15 FIG. 1 shows a perspective view of an exemplary embodiment of an article of footwear according to the present invention.

FIG. 2 shows a perspective view of an exemplary embodiment of a sole according to the present invention.

20 FIG. 3 shows a cross-sectional view of a sole according to the present invention taken on line 3—3 of FIG. 2.

FIG. 4 shows a cross-sectional view of a sole according to the present invention taken on line 4—4 of FIG. 2.

FIG. 5 shows a perspective view of alternate exemplary embodiment of a sole according to the present invention.

FIG. 6 shows a block diagram representation of an exemplary embodiment of the method according to the present invention for making an improved sole.

FIGS. 7A through 7D illustrate an exemplary embodiment of the method according to the present invention.

Detailed Description of Preferred Embodiments

Reference now will be made to embodiments of the invention, one or more examples of which are set forth below. Each example is provided by way of explanation of the invention and not as a limitation. In fact, it will be apparent to those skilled in the art that various additional modifications and variations can be made in this invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention cover such modifications and variations as come within the scope of the appended claims and their equivalents. Other objects, features, and aspects of the present invention are disclosed herein or are obvious from the following detailed description.

Referring to FIG. 1, a shoe generally 10 is illustrated having an upper 12, and a sole generally 14 secured thereto. Sole 14 includes a midsole (not shown) and an outsole 40 with a forefoot portion 42, an arch portion 45, and a heel portion 44, is secured to upper 12. Sole 14 has at least one pod and at least one

of the forefoot portion 42 and heel portion 44. Upper 12 can take any shape or form according to the design characteristics of the shoe and sole 14 may be secured to upper 12 through vulcanization, stitching, or other methods known in the art.

5 As shown in FIG. 2, a preferred embodiment of a sole 14 for an article of footwear is illustrated. Sole 14 includes an outsole with forefoot pod 20 and a heel pod 22. However, multiple pods are contemplated by the present invention and, as such, the present invention should not be limited to only forefoot pod 20 and heel pod 22 illustrated in FIG. 2. Additional pods may vary by size, shape
10 and location but will have the slip resistant characteristics and physical features described for forefoot pod 20 and heel pod 22.

Forefoot pod 20 and heel pod 22 are surrounded by material of outsole 40. Forefoot pod 20 and heel pod 22 are formed from a slip resistant rubber and formed into appropriate shape and size. Although rubber is preferred, other
15 materials exemplified, without limitation, by thermoplastic rubber (TPR) and polyvinyl chloride (PVC) may be utilized to form pods 20 and 22 so long as the desired slip resistant characteristics are present. By providing a forefoot pod 20 and heel pod 22 formed from rubber, sole 14 of the present invention provides increased slip resistance and improved traction. Additionally, forefoot pod 20
20 and heel pod 22 may be textured as illustrated at 24 for yet further improved traction. Other texturing would be acceptable so long as it affords the desired traction.

Outsole 40 is located adjacent to forefoot pod 20, in arch portion 45, and adjacent to heel pod 22, and has a periphery following the general contour of a human foot. Outsole 40 has a forefoot portion 42 and a heel portion 44, and is formed by injection molding polyurethane (PU), ethylene vinyl acetate (EVA), thermoplastic polyurethane (TPU), or other materials may be used to mold outsole 40 so long as the material affords good resilience and shock absorption properties. Outsole 40 also preferably has a structural component or web 46 that extends over the arch portion 45 and connects forefoot portion 42 and heel portion 44.

Referring now to FIGS. 3 and 4, cross-sectional views of a preferred sole according to the present invention is illustrated taken along lines 3—3 and 4—4 of FIG. 2. Forefoot pod 20 has a ground-engaging end 26 and an upper end 28. Forefoot pod 20 is positioned in the forefoot portion 42 of outsole 40. A lateral flange 30 is positioned proximate to the upper end 28 and extends outwardly from upper end 28 of forefoot pod 20. In addition, heel pod 22 also has a ground-engaging end 27 and an upper end 29. Heel pod 22 is positioned in the heel portion 44 of outsole 40 and includes lateral flange 32 extending from upper end 29 of heel pod 22. Upper ends 28, 29 of the forefoot pod 20 and heel pod 22 are secured in situ to the outsole 40 during molding, such that the outsole 40 encapsulates pods 20, 22 including the upper ends 28, 29 and flanges 30, 32 to provide securement between outsole 40 and pods 20, 22. Flanges 30, 32 may be located inwardly from upper end 24 and may extend only partially around the pod or be provided as separate segments around the perimeter of the pod.

Additionally, flanges 30, 32, in whatever form, may define one or more openings 34 therethrough (see FIG. 5), and may be located therearound as desired or necessary. Outsole 40 thus encapsulates flanges 30, 32 and extends through openings 34, provided for additional securement or integrity of sole 14. Ground-
5 engaging surface 48 of outsole 40 is generally coterminous with the ground-engaging ends 26, 27 of the pods 20, 22. A space 33 may be defined by the area between the ground-engaging surface 48 of outsole 40 and the ground-engaging ends 26, 27 of the pods 20, 22.

As stated previously, one or more pods are contemplated by the present
10 invention. Additional pod arrangements are depicted in phantom in FIG. 5.

While the depicted pod arrangements occupy the entire forefoot portion 42 and heel portion 44 of outsole 40, the pods may occupy smaller portions of either or both portions of the outsole 40.

Other types of protrusions from the periphery of the pod may be utilized, in
15 lieu of a flange so long as the outsole 40 will encapsulate in situ such protrusion(s) in such a manner so as to provide adequate securement between the outsole 40 and the pod.

With reference to FIGS. 6 and 7A through 7D, an exemplary embodiment of a method according to the present invention will be described. However, since
20 multiple pods are contemplated by the present invention, it should be understood that the present method is not limited only to one or both of forefoot pod 20 and heel pod 22 illustrated in FIGS. 7A through 7D. Instead, FIGS. and related discussions are exemplary only.

Referring now to FIGS. 6 and 7A through 7D, a top mold section 50 and a bottom mold section 52 are provided and define a forefoot cavity 54 and a heel cavity 56 according to the sole to be produced. The cavities 54, 56 define pod receiving sections 58, 60. Walls 55 separate pod receiving sections 58, 60 from cavities 54, 56. The width of walls 55 determines the width of a space 33 and the height of the walls determines the depth of space 33 between the ground-engaging surface 48 of outsole 40 and the ground-engaging ends 26, 27 of the pods 20, 22.

While only one pair of pod receiving sections 58, 60 are shown, in some embodiments such molds will include more than two pod receiving sections. The size and shape of the mold sections 50, 52 will vary in accordance to the size and shape of the sole being produced. Pods 20, 22 are positioned in their respective pod receiving sections 58, 60 so that the ground-engaging ends 26, 27 are surrounded by the pod receiving sections 58, 60 and the flanges 30, 32 extend outward above the cavities 54, 56 preferably substantially parallel to the ground-engaging ends 26, 27 of the pods 20, 22. Top mold section 50 and bottom mold section 52 are joined to form a complete mold cavity 53. Mold cavity 53 is filled with the desired moldable material 62, preferably polyurethane, to form outsole 40 while material 62 encapsulates the upper ends 28, 29 or other desired portions of the pods as well as the flanges 30, 32 extending outwardly therefrom. In a preferred embodiment, polyurethane is injected into the mold cavity 53 in conventional fashion. After curing, the top mold section 50 and

bottom mold section 52 are separated and the pod encapsulated outsole 40 is removed from the bottom mold section 52.

Additional securement between the pods and midsole may be desired. In some embodiments, the lateral flanges may define openings 34 which permit the material to flow through the openings 34 for further securement of outsole 40 to the pod.

Following outsole production, outsole 40 will be secured to an upper as desired to form the footwear. Obviously in manufacture of the footwear, additional conventional materials such as an insole, or the like, may be added to the shoe.

It should be appreciated by those skilled in the art that modifications and variations can be made to the exemplary embodiment of the present invention as described herein, without departing from the scope and spirit of the claims. It is intended that the invention include such modifications and variations as come within the scope of the appended claims and their equivalents.